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# FOREST PRODUCTS UTILIZATION

## TECHNICAL REPORT

No. 5

### SALVAGING FLOODED LUMBER

As soon as the water in flooded areas recedes, lumber dealers, manufacturers, builders, and others whose dry lumber has been submerged are confronted with a tremendous task of salvage. Of first importance are measures to reduce losses from stain and decay, particularly in easily damaged wood species. Cleaning and redrying operations should therefore begin at once.

#### Treatment of Lumber in Stickered Piles

Where the water has been high enough to float lumber stored in stickered piles, sapwood will be thoroughly infected with fungi before the boards can be collected, cleaned, sorted, and repiled. Heartwood boards of either softwoods or hardwoods are not so likely to stain and decay, but the wet boards should be cleaned and piled for redrying as soon as possible. Quick redrying, either in air-drying piles, low-temperature dryers, or dry kilns, is the only certain way to prevent excessive losses from stain and decay.

If the piles have stood fast on their foundations, the lower courses in the piles are likely to be covered with silt or choked with rubbish brought in by the water. This debris should be flushed away with a hose at the earliest opportunity, and water left standing on the yard, particularly under piles, should be drained off.

It may be necessary to repile stickered lumber in order to remove silt from the boards satisfactorily. The drier lumber from the upper layers of the old pile should be placed in the lower parts of the new piles, so that the wet stock is higher in the pile where more favorable atmospheric conditions speed the redrying process. If wet lumber must be bulk-piled for as long as a week before it is repiled with stickers, a chemical treatment is advisable.

Losses due to stain and decay may not be serious if lumber is cleaned promptly and the weather favors fast drying of stickered piles. Suggestions regarding stickered piling of lumber and chemical treatment of wet stock are given elsewhere in this report.

#### Treatment of Lumber in Bulk Piles

When lumber that has been dried and bulk-stored in either a shed or a yard is flooded, it should be cleaned and redried as soon as possible. The boards should be cleaned to remove surface accumulation of silt and allowed to drain long enough to remove

surface moisture. A dip or spray treatment with antistain chemicals may be helpful at this point. The stock should then be piled on stickers for air drying.

Kiln drying soon after the stock is cleaned is the safest procedure for avoiding losses, however. A chemical treatment is advisable if the cleaned wet boards must be bulk-piled for some time before they can be kiln dried.

#### Piling Lumber for Air Drying

The best practice is to sort the boards for length so that the piles can be built with square front and rear ends. If sorting for length is not possible, mixed lengths of lumber should be box-piled to avoid serious losses due to warping of unsupported ends. Box piles are characterized by the square appearance of both pile ends, the support of all outer board ends and most of the inner board ends by stickers, and the support of the outer ends of stickers by boards. The longest boards or planks are placed in the two outer tiers. Shorter boards are placed between the tiers of long boards with ends alternating between the front and rear ends of the pile.

Lumber should be piled on strong foundations high enough off the ground to allow good air circulation underneath the pile. The posts or piers, stringers, and cross beams of the foundation should provide adequate support to the pile and rows of stickers.

The stickers used to separate the layers of boards are usually ripped from nominal 1-inch lumber and are 1-1/4 inches wide. They are usually several inches longer than the width of the pile, and they should be made from dry stock if it is available. The number of stickers used will vary, but at least five stickers should be used on 16-foot lumber. In building up the pile, the stickers should be carefully aligned over the crossbeams, as otherwise the boards they rest upon may warp.

In yards and plants using lift trucks and unit-package handling methods, the cleaned lumber should be repiled into good, sorted-length, stickered packages. The packages can be box-piled if sorting for length is not feasible. Package foundations should be higher than usual in flooded and drained areas.

Additional detailed information on how to handle lumber for air drying is given in Agriculture Handbook No. 402, "Air Drying of Lumber." It is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, for \$1.00.

## Kiln Drying Flooded Lumber

Kiln drying promptly after cleaning is the best and safest way to reduce losses from stain and decay in flooded lumber. Dried lumber that has been wetted will dry rapidly, and the experienced dry kiln operator will be able to put through charges of either softwoods or hardwoods much more rapidly than is usual for wood at the same moisture content that has not been previously dried to a lower moisture content. The regained moisture is mostly in the outer fibers of the boards and evaporates quickly. Re-wetting does not damage lumber as long as it is dried promptly.

### Dips or Sprays With Chemical Solutions

Dip or spray treatments with common antistain solutions are used principally to prevent deterioration of sapwood, but these treatments may also help protect heart-wood against infection. They are most effective if applied as soon as possible to the wet lumber. Lumber that has been wet for a week or more will benefit little from chemical treatment unless temperatures have been too low (below 60° F.) during flooding for rapid infection to take place. At best, chemical treatment should be considered only as a supplementary measure to rapid air drying or kiln drying.

The dipped or sprayed stock should be properly piled soon after treatment, so that drying will not be retarded. If it cannot be promptly repiled on stickers for air drying, the treated stock may be temporarily left in bulk piles. Temporary bulk piling after dipping is known to be safe with freshly cut lumber, but with flooded stock the situation is uncertain; consequently, efforts should be made to hold bulk storage of the wet, chemically treated wood to as short a time as possible.

The following solutions are recommended for dip or spray treatment of lumber to prevent stain, mold, or decay:

| <u>Product</u> | <u>Suggested number of pounds<br/>per 100 gallons of water</u> | <u>Chemical composition</u>             |
|----------------|--|---|
| Dowicide G     | 12   | Sodium pentachlorophenol                |
| Santobrite     | 21   | Sodium pentachlorophenate               |
| Permatox 10s   | 30   | Sodium pentachlorophenate<br>plus borax |

Dowicide G and Permatox 10s can be obtained from Chapman Chemical Company, P.O. Box 9158, Memphis, Tenn. 38109, and Santobrite from Koppers Company, Koppers Building, Pittsburgh, PA 15219.

At small sawmills, green lumber is commonly dipped by hand, the work being done by one or two men. This method can be used at retail lumber yards and manufacturing plants where chemical treatment of flooded lumber seems necessary. One man can regularly dip about 5,000 feet of 1-inch lumber in a day.

Dipping vats need to be little more than sturdy wood troughs of sufficient size to accommodate the largest boards and fitted with sloping sideboards to permit draining of the lumber and to prevent excessive waste of solutions from splashing. Suggestions for constructing hand-operated dipping vats may be obtained from companies supplying antistain chemicals.

At some mills, lumber, dimension, and timbers are sprayed by passing the stock on a roller conveyor through a spray box fitted with perforated pipes or special nozzles. Similar equipment can be used in a large salvage operation. Excess solution is recovered and flows or is pumped back into a storage tank.

Where the salvage operation is such that hand dipping or spraying is not feasible, the chemical can be applied with a hand-operated spray, sprinkling can, broom, or brush. Any of these devices is adequate so long as all surfaces of the cleaned lumber are completely wetted with the chemical solution.



### Treatment for Salvaged Logs

Logs are safe from stain and decay indefinitely as long as they are submerged, or under water spray, but they will begin to deteriorate as soon as they are partly or wholly exposed to the air. Ordinarily, the organisms that cause blue stain attack first, and they develop rapidly. Decay organisms work more slowly, but are more serious because they destroy the wood on which they grow. Further information on procedures to minimize log deterioration is available in a report, "Water Sprays Protect Hardwood Logs From Stain and Decay," Forest Products Journal, Volume 10, 1960. Reprints may be available through the Forest Products Research Society, 2801 Marshall Court, Madison, Wis. 53705.

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### PRECAUTION

This publication reports research involving pesticides. It does not contain recommendations for their use, nor does it imply that the uses discussed here have been registered. All uses of pesticides must be registered by appropriate State and/or Federal agencies before they can be recommended.

CAUTION: Pesticides can be injurious to humans, domestic animals, desirable plants, and fish or other wildlife--if they are not handled or applied properly. Use all pesticides selectively and carefully. Follow recommended practices for the disposal of surplus pesticides and pesticide containers.



For further information on this subject and other areas of forest products utilization, contact your State Forester who cooperates with the U.S. Forest Service in providing direct assistance to forest landowners, loggers, and wood processing firms.

These technical reports are issued by State and Private Forestry. Suggestions for topics for this report can be forwarded to Forest Products Laboratory, P.O. Box 5130, Madison, WI 53705.